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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Bradley *et al.*

Confirmation No.: 1834

Application No.: 10/071,497

Group Art Unit: 1771

Filed: February 8, 2002

Examiner: D.R. Zirker

For: RADIATION-CURED CORRECTION
TAPE

Attorney Docket No.: 618-1046-999

DECLARATION UNDER 37 CFR § 1.132

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Michael T. Nowak, a co-inventor of the above-identified application, hereby declare that:

1. I hold a Bachelor of Science degree in Organic Chemistry from Worcester Polytechnic University (1969). I am currently a Technical/Legal Liaison at BIC Corporation. My experience includes, but is not limited to, correction fluids, correction tapes and ink formulations that are solvent-based, water-based, ultraviolet-curable and electron beam-curable. More specifically, I have four years experience in the field of correction tapes. I am named inventor or co-inventor on over forty patents in the fields of ink formulation technologies and coatings including white opaque coatings and radiation-cured coatings, and I am the author of several published articles on the subject of radiation-cured coating. I am familiar with a variety of the literature, common practices, and products in the field of correction tapes. I am also familiar with the different methods for manufacturing correction tapes. I consider myself to be one of ordinary skill in the field of correction tapes.

2. I have reviewed the above-identified application along with the pending claims, the Office Action mailed on March 17, 2004 ("Office Action"), the Office Action mailed on September 5, 2003, and U.S. Patent No. 6,162,492 to Narayanan ("Narayanan").

3. It is my understanding that claims 1-43 and 45 have been rejected as being unpatentable and the Examiner has cited Narayanan, *inter alia*. For the reasons discussed below, I disagree with comments in the Office Action with respect to Narayanan.

4. As described in the specification and the claims, the present invention is directed to a correction tape including a masking layer and pressure sensitive adhesive layer. The masking layer and/or the pressure sensitive adhesive layer are radiation cured. The masking layer and pressure sensitive adhesive layer of the present invention "contain reactive monomers, reactive oligomers or polymers cured by radiation." Application, page 6, lines 15-16. As described in the specification, "[o]ligomers or polymers suitable for radiation curing are those having free functional or reactive moieties such as vinyl, acrylate, methacrylate, vinyl ether, and epoxy. Such reactive oligomers or polymers can optionally contain more than one reactive group. ... The use of monomers with more than one reactive group blended with such suitable oligomers produces a coating with a coatable viscosity plus a high degree of cross-linking." Application, page 7, lines 8-14. The specification also states: "Such radiation curing produces an infusible (non-meltable) three-dimensional cross-linked polymer network. The radiation-cured layers are essentially insoluble in organic solvents and water, and the cured layers exhibit improved film toughness and improved resistance to ink 'bleed through.'" Application, page 4, lines 7-10.

5. Narayanan is directed to a multi-layer correcting tape that includes a carrier, a covering layer and an adhesive layer. Narayanan does not state that the covering layer or adhesive layer is radiation cured.

6. The covering layer of Narayanan's correction tape is applied as an aqueous suspension "by means of a doctor blade onto a carrier foil that is preferably siliconized in a different way on the two sides." Narayanan, col. 2, lines 46-48. An adhesive layer is then applied over the covering layer "[a]fter the drying of the layer containing pigment." Narayanan, col. 2, lines 60. Narayanan does not describe the process used to dry his covering layer, or whether his covering layer is cured by any process including, for example, radiation curing.

Similarly, Narayanan does not describe any properties of his dried covering layer or adhesive layer.

7. Given what was described in Narayanan, one of ordinary skill in the art would not expect that a covering layer formed *only* by *drying* an aqueous polymer suspension as taught by Narayanan would provide an infusible three-dimensional cross-linked polymer network like that formed in the present invention by radiation curing.

8. The covering layer of Narayanan is formed from a “film-forming binding agent” and “binding agents that act in a friable manner.” Narayanan, col. 1, line 67; col. 2, line 19. Narayanan states that “[f]ilm-forming binding agents are, for example, terpolymer dispersions based on vinyl acetate and acrylic acid esters” and “copolymers based on acrylic acid esters with the use of acrylonitrile.” Narayanan, col. 2, lines 10-17. Narayanan further states that “binding agents that act in a friable manner are, for example, acrylic polymers, particularly those in ammonia” and “copolymers containing carboxylic groups based on acrylic acid esters.” Narayanan, col. 2, lines 18-24.

9. Narayanan does not describe any reactive monomers, oligomers or polymers that can be radiation cured. Instead, Narayanan describes terpolymer dispersions (based on vinyl acetate and acrylic acid esters) (col. 2, lines 10-11); “acrylic polymers, particularly those in ammonia” (col. 2, line 20); and copolymers containing carboxylic groups (based on acrylic acid esters) (col. 2, lines 24-25) in the covering layer. There is no disclosure in Narayanan that these terpolymers, polymers, and copolymers include any reactive monomers or oligomers that are available for a curing reaction, or that such terpolymers, polymers, and copolymers can be cross-linked using ionizing radiation. In addition, there is no indication in Narayanan that the adhesive layer includes any reactive monomers or oligomers that are available for a curing reaction, or that there is a polymer in the adhesive layer that can be cross-linked using ionizing radiation. Therefore, one of ordinary skill in the art would not use radiation to cure the covering layer or adhesive layer of Narayanan.

10. I have also reviewed Lenz, R., *Organic Chemistry of Synthetic High Polymers* 749 (1967) (the “Lenz reference”) (which was submitted with the Amendment filed on January 5, 2004, and a copy is attached hereto as Exhibit 1). The Lenz reference states that:

both ultraviolet light and ionizing radiation are responsible for two general type of reactions: chain scission and cross-linking. The competition between these two reactions determines whether the net result of exposure

of a polymer to radiation will be formation of low molecular weight fragments of that polymer or the formation of insoluble, infusible network structure.

11. As discussed in the Lenz reference, radiant energy degrades a polymer and undesirable chain scission competes with polymer cross-linking. Thus, as known in the art and described in the Lenz reference, polymeric layers such as those described in the tape of Narayanan *may* form an “insoluble, infusible network structure” or they *may* degrade into undesirable “low molecular weight fragments” upon application of radiation, particularly when no free functional or reactive moieties are present. Therefore, because the response of polymers to radiation curing is unpredictable, one of ordinary skill in the art would not radiation-cure the layers of Narayanan to obtain the correction tape of the present invention.

12. Even if the film-forming binding agent described by Narayanan contained reactive vinyl acetate and/or acrylonitrile monomer (which it does not), these monomers are relatively volatile¹ and would tend to vaporize during a radiation curing process as a result of localized heating. As a result of the volatilization of vinyl acetate and acrylonitrile during radiation curing, the terpolymer and copolymer films, respectively, would likely be non-uniform, contain structural defects, and/or contain unreacted monomer entrained within the cured film. Therefore, one of ordinary skill in the art would not radiation cure a terpolymer or copolymer film having monomers such as vinyl acetate or acrylonitrile.

13. In addition, vinyl acetate and acrylonitrile are suspected carcinogens (*see* the Material Safety Data Sheet (“MSDS”) for vinyl acetate from Scott Specialty Gases and the MSDS for acrylonitrile from Solutia, Inc., attached hereto as Exhibits 3 and 4, respectively). One of ordinary skill in the art would not use volatile, suspected carcinogens such as vinyl acetate and acrylonitrile in a radiation curing process where heating effects would likely cause the monomers to vaporize and increase the risk of exposure.

14. I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States

¹ Vinyl acetate and acrylonitrile boil at 72.5°C and 77.4°C, respectively, at 760 mmHg (*see Lange's Handbook of Chemistry* 7-876 and 7-90 (13th ed. 1985) (attached hereto as Exhibit 2)).

Code, and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Date: July 19, 2004

Michael T. Nowak
Michael T. Nowak

Attachments:

- Exhibit 1: Lenz, R., *Organic Chemistry of Synthetic High Polymers* 749 (1967)
- Exhibit 2: *Lange's Handbook of Chemistry* 7-876 and 7-90 (13th ed. 1985)
- Exhibit 3: Material Safety Data Sheet for vinyl acetate
- Exhibit 4: Material Safety Data Sheet acrylonitrile

Organic Chemistry of Synthetic High Polymers

Robert W. Lenz

Associate Professor of Chemical Engineering
and Member of the
Polymer Science and Engineering Faculty
University of Massachusetts
Amherst, Massachusetts

With Contributions

by

Darrell C. Feay

and

Nathaniel S. Schneider

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which, in turn, could decarboxylate at 300–500°C to yield the CO₂ observed.³¹

18.2. RADIANT ENERGY DEGRADATION OF POLYMERS

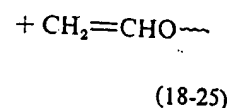
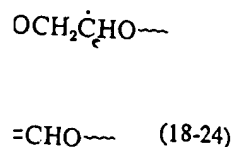
The subject of radiant energy degradation of polymers must be subdivided into two areas of discussion as far as reaction mechanisms are concerned. The two areas are: (1) degradation by ultraviolet light radiation ($\lambda = 10^4$ – 10^2 Å), termed photolysis, and (2) degradation by high energy radiation, termed radiolysis, involving x-rays, electron beams, and γ -rays ($\lambda = 10^2$ – 10^{-3} Å). The two differ basically in that ultraviolet light is much more specific. That is, ultraviolet light-induced degradation reactions involve absorption of energy in discrete units by specific functional groups or chromophores in the molecule, but the absorption of high energy radiation does not require the presence of specific chromophoric groups because the energy is transferred directly to electrons in the path of the high energy photons. Another aspect of this difference in specificity is that, although ultraviolet light will only excite an electron within a specific functional group to a higher electronic energy state, high energy radiation will often completely eject an electron from a molecule. Because of this behavior, the term ionizing radiation is applied to high energy radiation. For this distinction to be true, the amounts of energy transferred by the various types of radiation must be considerably different, and ultraviolet light imparts energy in the range of 10^2 – 10^3 kcal mole⁻¹, x-rays in the range of 10^5 – 10^7 kcal mole⁻¹, electron beams in the range of 10^4 – 10^6 and γ -rays in the range of 10^7 – 10^{10} kcal mole⁻¹.

As far as degradation of polymers is concerned, both ultraviolet light and ionizing radiation are responsible for two general types of reactions: chain scission and crosslinking. The competition between these two reactions determines whether the net result of exposure of a polymer to radiation will be the formation of low molecular weight fragments of that polymer or the formation of insoluble, infusible network structures.

18.2.1. Photolysis

Kinetic equations for the competition between chain scission and crosslinking in the photolytic degradation of polymers have been derived and applied to several polymers.^{48,49} These treatments have permitted the determination, in some cases, of quantum yields for either chain scission or crosslinking reactions, or both, and also the determination of quantum yields for the production of various volatile products. For example in the photolysis of poly(methyl vinyl ketone) in dioxane solution irradiated by light of 3130 Å. wavelength, the quantum yield for chain scission (that is,

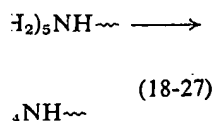
phthalic acid,^{46,47} ination of radical 1 (18-24) or by a lioxide would be



mediate carboxylic and acetaldehyde nge or anhydride formed in small



f nylon 66, poly- ide.⁴⁷ The most levated tempera- 1 the amide, and 7) of a primary



amide could then and the presence carboxyl groups,

LANGE'S HANDBOOK OF CHEMISTRY

EDITOR: JOHN A. DEAN

Professor Emeritus of Chemistry
University of Tennessee (Knoxville)

Formerly Compiled and Edited by
NORBERT ADOLPH LANGE, Ph.D.

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No.	Name	Formula	Formula weight	Beilstein reference	Density	Refractive index	Melting point	Boiling point	Flash point	Solubility in 100 parts solvent
a101	Acetylsalicylic acid	$\text{HOOC}_6\text{H}_4\text{—OCOCH}_3$	180.16	10, 67	1.35		135			0.33 aq ²⁵ ; 20 alc; 5.9 chl; 5 eth, sl s bz
a102	2-Acetylthiophene		126.18	17, 287	1.168 ²²	1.5654 ²⁰	10–1	214		sl s aq; misc alc, eth
a103	3-Acetylthiophene		126.18	17 ¹ , 4520			58–61	212		
a104	1-Acetylthiosemicarbazide	$\text{CH}_3\text{CONHNH—C(=S)CH}_3$	133.17	3, 196			165–8			
a105	(2-Acetylthio)succinic anhydride		174.18				85–7			
a106	N-Acetylthiourea	$\text{CH}_3\text{CONHC(=S)NH}_2$	118.16	3, 191			165–9			s hot aq; s alc; sl s eth
a107	N-Acetyl-DL-tryptophan		246.27	22 ¹ , 469			204–6			s aq, alc; v s eth
a108	N-Acetyl-L-tryptophan		246.27				189–90			s aq, alc
A109	Acid alizarin violet N		366.33	16 ¹ , 127						
a110	Acid fuchsin		585.55							
a111	Acridine		179.22	20, 459						14 aq
a112	Acrylamide	$\text{H}_2\text{C=CHCONH}_2$	71.08	2, 400	1.122 ²⁰		107–10 subl 110	346		s alc, eth, CS_2 , PE, CS_2
a113	Acrylic acid	$\text{H}_2\text{C=CHCOOH}$	72.06	2, 397	1.0511 ²⁰	1.4224 ²⁰	13	140–1	54	215 ³⁰ aq; 86 ³⁰ alc; 63 ³⁰ acet; 2.7 ³⁰ chl; v s eth
a114	Acrylonitrile	$\text{H}_2\text{C=CHCN}$	53.06	2, 400	0.8060 ²⁰	1.3911 ²⁰	–83.7	77.4	0	misc aq, alc, eth, bz, chl, acet
a115	Acryloyl chloride	$\text{H}_2\text{C=CHCOCl}$	90.51	2, 400	1.114	1.4350 ²⁰	206–8	72–6	16	7.3 aq; misc org solv
a116	1-Adamantanamine		151.25							d aq; v s chl
a117	Adamantane		136.24		1.09	1.568	268 sealed tube	205 subl		sl s aq

a118	Adamantanecacetic acid		194.27				131–2			
a119	1-Adamantanecarbonyl chloride		198.69				49–51			> 112
a120	1-Adamantanecarboxylic acid		180.25				174–5			
a121	1-Adamantanecarbamide		179.26				185–7			
a122	1-Adamantanol		152.24				> 240	subl		

N-Acetylsulfanilyl chloride, a11
 2-Acetyl-1-tetralone, a67
 Acid violet 19, a110
 Acetic acid, p397, p398
 Acridine orange, b258
 Acridine, d85
 Acrolein, p394
 Acrolein diethyl acetal, d506
 Acrolein dimethyl acetal, d887
 Acrylaldehyde, p394
 1-Adamantanemethanol, b291
 1-Adamantanemethylamine, a360

u10	10-Undecenoic acid	$\text{CH}_2=\text{CH}(\text{CH}_2)_9\text{COOH}$	184.28	2, 458	0.907 ²⁴	1.4493 ²⁰	24.5	137 ²⁰	148	i aq; s alc, eth, chl
u11	10-Undecen-1-ol	$\text{CH}_2=\text{CH}(\text{CH}_2)_9\text{OH}$	170.30	1, 452	0.850 ¹⁵	1.4500 ²⁰	-2	245	93	
u12	10-Undecenyl chloride	$\text{CH}_2=\text{CH}(\text{CH}_2)_9\text{COCl}$	202.73	2, 459	0.944	1.4532 ²⁰		122 ¹⁰	93	
u13	Undecylamine	$\text{H}(\text{CH}_2)_{11}\text{NH}_2$	171.33	4, 199	0.796	1.4388 ²⁰	16.5	240	92	s hot aq, alc, i eth
u14	Undecylbenzene	$\text{H}(\text{CH}_2)_{11}\text{C}_6\text{H}_5$	232.39		0.8553	1.4868		313		
u15	Urea	$\text{H}_2\text{N}-\text{CO}-\text{NH}_2$	60.06	3, 42	1.324 ¹⁸		132.7	d > mp		100 aq; 20 alc; sl s eth

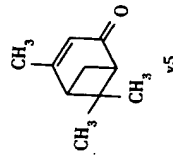
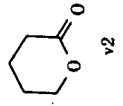
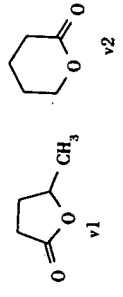
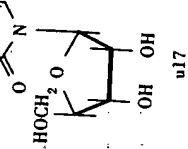
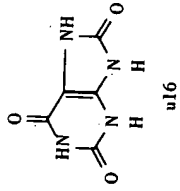
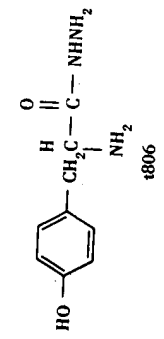
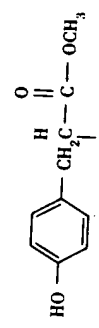
u16 Uric acid

u17	Uridine		163.10	26, 518	1.693 ²⁰		> 800			i aq, alc, eth, s alk
v1	γ-Valerolactone		244.20	31, 23			165			s aq; hot alc, pyr
v2	δ-Valerolactone		100.12	17, 235	1.057	1.4330 ²⁰	-31	207-8	81	
v3	D-Valine		100.12	17, 235	1.079	1.4575 ²⁰	d 298	60 ¹⁰	100	
v4	L-Valine	$(\text{CH}_3)_2\text{CHCH}(\text{NH}_2)\text{COOH}$	117.15	4, 430			315	subl		8.6 aq ¹⁵ ; v sl s alc, eth
v5	D-Verbene	$(\text{CH}_3)_2\text{CHCH}(\text{NH}_2)\text{COOH}$	117.15	4, 427	1.230		6.5	227-8	85	8.8 aq ¹⁵ ; v sl s alc, eth
v6	Vinyl acetate	$\text{CH}_2=\text{CHO}-\text{COCH}_3$	150.22	7, 161	0.9780 ²⁰	1.4955 ²⁰				i aq; misc alc, eth

Tyramine, a302
 Umbelliferone, h228
 Undecyl alcohol, u5
 Undecyl cyanide, d1407
 Undecyl-10-ene-1-ol acid, u10
 Undecylenic aldehyde, u8
 Undecylenic aldehyde, u1
 Uracil, p510
 Uracil-6-carboxylic acid, d1255
 Urazole, t365
 S-Ureidohydantoin, a134
 Urethane, e153

Urocanic acid, i7
 Valeraldehyde, p54
 Valeric acid, p65
 δ-Valerolactam, p369
 Valerone, d1030
 Valeronitrile, p62
 Valerophenone, p70a
 Valeryl chloride, p71
 Valinol, a369, a370
 Vanillic acid, h281
 Vanillin, h279

α-Vanillin, h276
 Vanillyl alcohol, h285
 Vanillylamine, h286
 Veratraldehyde, d837
 Veratric acid, d846
 Veratrole, d839
 Veratryl alcohol, d854
 Veratrylamine, d854a
 Veronal, d542
 Vinylacetic acid, b664
 Vinylacetylene, b670



Solutia Inc.

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: ACRYLONITRILE

Reference Number: 000000000220

Date: 11/10/2003

Company Information:

United States:

Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
Non-Emergency telephone: 1-314-674-6661

Canada:

Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:

Solutia MEXICO, S. DE R.L. DE C.V.
Blvd. Manuel Avila-Camacho No. 40 Piso 12 Colonia Lomas
de Chapultepec
Edificio Torre Esmeralda 11000 Mexico, D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 555-202-5600

Brazil:

Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>Components</u>	<u>CAS No.</u>	<u>Average concentration</u>	<u>Concentration range</u>	<u>Units</u>
acrylonitrile	107-13-1		>=99.5 - <=99.7	%
water	7732-18-5		>=0.25 - <=0.45	%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form: liquid
Colour: colourless
Odour: pungent

WARNING STATEMENTS

DANGER!
Extremely hazardous liquid and vapour

Flammable liquid and vapour
May be fatal if inhaled
May be fatal if swallowed
May be fatal if absorbed through skin
If exposed, take first aid action immediately. Symptoms may be delayed.
Contains Acrylonitrile (AN) - Cancer Hazard
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
May cause allergic skin reaction.
Use only in a closed system

POTENTIAL HEALTH EFFECTS

Likely routes of exposure:	eye and skin contact inhalation
Eye contact:	Highly irritating to eyes.
Skin contact:	May be fatal if absorbed. Highly irritating to skin. May cause allergic skin reaction.
Inhalation:	May be fatal if inhaled. Severely irritating if inhaled.
Ingestion:	May be fatal if swallowed.
Signs and symptoms of overexposure:	weakness coughing laboured breathing headache confusion nausea/vomiting convulsions heart rate and pulse variations coma respiratory failure
Carcinogenicity:	Contains a component that is a National Toxicology Program (NTP) listed carcinogen. Contains a component regulated by OSHA as a carcinogen.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

General:	Poison Get medical attention. Contact a Poison Control Center. Get patients to fresh air, have them lie down. Remove contaminated clothing but keep patient warm. Start decontamination and indicated treatment immediately. Rescuers must use care to prevent contact with the material. Symptoms suggesting use of antidote may include dizziness, headache, confusion, nausea or difficult breathing.
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If in eyes:	Immediately flush with plenty of water for at least 15 minutes. Administer 100% oxygen. If symptoms occur, administer ANTIDOTE TREATMENT as described below. If not breathing, give artificial respiration.
If on skin:	Immediately flush with plenty of water for at least 15 minutes. Remove contaminated clothing. Wash clothing before reuse. Destroy contaminated shoes.
If inhaled:	Remove patient to fresh air. Administer 100% oxygen. If symptoms occur, administer ANTIDOTE TREATMENT as described below. If not breathing, give artificial respiration.
If swallowed:	Administer 100% oxygen. If symptoms occur, administer ANTIDOTE TREATMENT as described below. If not breathing, give artificial respiration.
Antidotes:	Break an amyl nitrite pearl in a cloth and hold pearl lightly under nose or place inside oxygen mask for 30 seconds. Repeat inhalation of amyl nitrite at about 30-second intervals. Resume oxygen between amyl nitrite. Use a new amyl nitrite pearl every 3 to 5 minutes until directed otherwise by medical personnel.
Notes to physicians:	Call a Poison Control Center for guidance. If patient exhibits signs suggestive of cyanide poisoning following the exposure, and has not responded to amyl nitrite, inject intravenously 10 milliliters of a 3% solution of sodium nitrite at a rate not greater than 2.5 to 5.0 milliliters per minute. Follow directly with 50 milliliters of a 25% solution of sodium thiosulfate at the same rate by the same route. Keep patient under observation. Oxygen therapy may be of value in combination with nitrite and sodium thiosulfate treatment. If signs of poisoning persist or reappear, repeat nitrite and thiosulfate injections 1 hour later in one half the original doses.

5. FIRE FIGHTING MEASURES

Flash point:	0 C -5 C	Open cup Closed cup
Autoignition temperature:	481 C	
Upper explosion limit:	28 %(V)	
Lower explosion limit:	2.8 %(V)	
Hazardous products of combustion:	carbon monoxide (CO); hydrogen cyanide (HCN); nitrogen oxides (NOx); nitrogenous products	
Extinguishing media:	Water spray, foam, dry chemical, or carbon dioxide	
Unusual fire and explosion hazards:	There is a possibility of pressure build-up in containers when heated. Keep containers cool by spraying with water if exposed to fire.	
Fire fighting equipment:	Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full protective clothing. Equipment should be thoroughly decontaminated after use.	

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions: Evacuate if necessary.
Keep unauthorized persons, children and animals away from the affected area.
Keep upwind.
Remove any sources of sparks, flame, or hot surfaces.
Shut off leaks if without risk.
Wear full protective clothing.
Wear self-contained breathing apparatus.
Ensure adequate ventilation.
- Environmental precautions: Keep out of drains and water courses.
Notify authorities.
- Methods for cleaning up: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling

Amyl nitrite is an antidote.
Always have a cyanide first aid kit on hand.
Do not breathe gas/fumes/vapour/spray.
Do not get in eyes, on skin, or on clothing.
Do not taste or swallow.
Keep away from heat, sparks, and flame.
Wear protective equipment including rubber gloves, rubber apron, rubber footwear, goggles and face shield.
Use with adequate ventilation.
Clean protective equipment before reuse.
Wash thoroughly after handling.
Keep container closed.

Container hazardous when empty. Emptied containers retain vapour and product residue. Follow labelled warnings even after container is emptied. Do not cut, drill, grind or weld on or near this container. Improper disposal or reuse of this container may be dangerous and/or illegal. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage

General: Do not expose to extreme temperatures.
Stable under normal conditions of handling and storage.
Store in a cool, well ventilated place away from foodstuffs, reducing agents and acids.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- Eye protection: Wear face shield.
Have eye wash facilities immediately available at any location where eye contact can occur.
- Hand protection: Wear chemical resistant gloves.
Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application.
- Body protection: Wear suitable protective clothing.
Consult the glove/clothing manufacturer to determine the appropriate type

glove/clothing for a given application.
Wear full protective clothing if exposed to splashes.
Remove contaminated clothing.
Wash contaminated skin promptly.
Launder contaminated clothing and clean protective equipment before reuse.
Have safety shower available at locations where skin contact can occur.
Wash thoroughly after handling.
Attention! Repeated or prolonged contact may cause allergic skin reaction in some people.

Respiratory protection: Avoid breathing vapour or mist.
Use approved respiratory protection equipment (full facepiece recommended) when airborne exposure limits are exceeded.
If used, full facepiece replaces the need for face shield and/or chemical goggles.
Consult the respirator manufacturer to determine the appropriate type of equipment for a given application.
Observe respirator use limitations specified by the manufacturer.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits.
If practical, use local mechanical exhaust ventilation at sources of air contamination such as processing equipment.

Airborne exposure limits: (ml/m³ = ppm)

acrylonitrile ACGIH TLV: 2 ml/m³ ; 4.3 mg/m³ ; ; 8-hr TWA
* skin absorption of this material may add to the overall exposure.
A3: The ACGIH has designated this component as an "A3" substance thereby including it among substances that are confirmed animal carcinogens with unknown relevance to humans.
OSHA PEL: 10 ml/m³ ; skin * ; 15-min STEL
OSHA PEL: 2 ml/m³ ; ; 8-hr TWA
Mexican OEL: 2 ml/m³ ; 4.5 mg/m³ ; ; 8-hr TWA
* skin absorption of this material may add to the overall exposure.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific gravity: 0.806 @ 20 C
Boiling point : 77.3 C @ 1,013 hPa
Freezing point -83.5 C
Vapour pressure: 133 hPa @ 25 C
Water solubility: 73.5 g/l @ 20 C
Vapour density (air=1): 1.8 @ 77.3 C

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid:	Elevated temperatures All sources of ignition. Prolonged exposure to sunlight may cause polymerization.
Materials to avoid - Hazardous reactions:	Contact with strong oxidizing agents. Contact with alkalis. Contact with bromine. Contact with ammonia. Contact with amines. Contact with copper and alloys. Contact with acids. Will polymerize violently when contacted with strong alkali
Hazardous decomposition products:	hydrogen cyanide (HCN); carbon monoxide (CO); nitrogen oxides (NOx); nitrogenous products

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral:	LD50 , rat, 186 mg/kg , Moderately toxic following oral administration.
Dermal:	LD50 , rabbit, 280 mg/kg , Moderately toxic after skin application in animal studies.
Inhalation:	LC50 , rat, > 2.185 mg/l , 1 h, Slightly toxic based on animal inhalation exposure studies.
Eye irritation:	rabbit , Severely irritating,
Skin irritation:	rabbit , Severely irritating,
Repeat dose toxicity:	mouse & rat & guinea pig & dog & rabbit & primate, various, repeat dose, Repeated oral administration produced multiple systemic effects. Repeated inhalation exposure produced multiple systemic effects.
Target organs affected	brain
Developmental toxicity:	rat & mouse & guinea pig, gavage, , Birth defects (malformations) noted in animal studies only at dose levels which produced maternal and/or fetal toxicity.
Reproductive toxicity:	rat, diet, 3 generation, Signs of generalized toxicity (reduced body weight and/or reduced weight gain) were observed in parental animals and offspring with no effect on fertility or reproduction. Human experience, various, daily, Possible risk of impaired fertility., Possible risk of harm to the unborn child. Information of uncertain reliability.
Carcinogenicity:	rat, various, chronic, This material produced tumours in laboratory animals. Listed as a substance that "may reasonably be anticipated to be" carcinogenic by the National Toxicological Program (NTP) and is classified as "possibly carcinogenic to humans" by the International Agency for Research on Cancer (IARC).

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Mutagenicity: Both positive and negative responses observed in standard tests for genetic changes.
Genetic effects were observed in standard tests using bacterial and animal cells.
No genetic effects were observed in standard tests using whole animals.

12. ECOLOGICAL INFORMATION

Environmental Toxicity:

Invertebrates	48 h, EC50	Water flea (<i>Daphnia magna</i>)	22 mg/l
Fish:	96 h, LC50	Rainbow trout (<i>Oncorhynchus mykiss</i>)	24 mg/l
	96 h, LC50	Fathead minnow (<i>Pimephales promelas</i>)	15 mg/l

Environmental fate

Biodegradation
Readily biodegradable.

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded is a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. See disposal considerations below for U.S. EPA disposal requirements. Consult regulatory officials for performance standards.

US EPA RCRA
hazardous waste number: U009 Compound/Characteristic: Acrylonitrile

Disposal considerations: Incineration
Consult 40 CFR 268.40 or appropriate local regulations for concentration based standards.

Miscellaneous advice: Local, state, provincial, and national disposal regulations may be more or less stringent. Consult your attorney or appropriate regulatory officials for information on such disposal.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name: ACRYLONITRILE, STABILIZED

Hazard Class: 3, 6.1
Hazard Identification number: UN1093
Packing Group: Packing Group I
Transport label: Flammable, Toxic

Canadian TDG

Proper shipping name: ACRYLONITRILE, STABILIZED

Product name: ACRYLONITRILE
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Hazard Class: 3, 6.1, 9.2
Hazard Identification number: UN1093
Packing Group: Packing Group I
Transport label: Flammable, Toxic

Reportable Quantity/Limit
US DOT RQ 100 lb *acrylonitrile*
Package size containing reportable amount: 100 lb

ICAO/IATA Class
Other: See DOT Information, Forbidden by Passenger Aircraft Only

15. REGULATORY INFORMATION

All components are in compliance with the following inventories: U.S. TSCA, Canadian DSL, EU EINECS, Japanese ENCS, Australian AICS, Korean, Phillipine PICCS, Chinese

Canadian WHMIS classification: B2 - Flammable Liquids
D1(A) - Materials Causing Immediate and Serious Toxic Effects
D2(A) - Materials Causing Other Toxic Effects
D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370): Immediate
Delayed
Fire

Section 302 Extremely Hazardous Substances: acrylonitrile

Section 313 Toxic Chemical(s): acrylonitrile

CERCLA Reportable Quantity:

100 lbs acrylonitrile
For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

Product use: Intermediates

Reason for revision: Significant changes to the following section(s); Section 14

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	4	3	2	

Product name: ACRYLONITRILE
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Suggested HMIS Rating: 4 3 2 J

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

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Scott Specialty Gases

Material Safety Data Sheets

MSDS No: 108-05-4
Date: 03/09/2001SUPPLIER: 6141 Easton Road, Bldg. 1
ADDRESS: PO Box 310
Plumsteadville, PA 18949-0310EMERGENCY PHONE: (215) 766-8861
NUMBER:

1. CHEMICAL PRODUCT

PRODUCT NAME: VINYL ACETATE

SYNONYMS: Acetic acid vinyl ester, Ethenyl ethanoate,
Acetic acid ethenyl ester

2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	Exposure Limits (PPM)		
					OSHA PEL	MAC	Other STEL
VINYL ACETATE	C ₄ H ₆ O ₂	108-05-4	99+%	10	10	10	15

Note: NE = NONE ESTABLISHED

S/A = SIMPLE ASPHYXIAN

3. HAZARD IDENTIFICATION

*** EMERGENCY OVERVIEW ***
Flammable liquid and vapor.
May form explosive mixtures with air.
May cause irritation to eyes, skin, and throat.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Ingestion

ACUTE EFFECTS: Vapor exposure can cause irritation of the eyes, nose, throat and respiratory tract. High vapor concentration may produce narcosis. Skin contact may cause irritation.

CHRONIC EFFECTS: Bronchitis. Central nervous system (CNS) depression, symptoms such as fatigue, irritability, insomnia, encephalopathy, vertigo, weakness and polyneuritis. Cardiovascular problems such as arrhythmias, chest pain and syncope. Suspected human carcinogen.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - Yes
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Have conscious and alert person drink 1 to 2 glasses of water. Do not induce vomiting because of aspiration hazard.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: -8 deg. C

AUTOIGNITION TEMPERATURE: 402 deg. C

FLAMMABLE LIMITS: Vol. %

LOWER: 2.6

UPPER: 13.4

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, or alcohol foam.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray. If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Severe when exposed to heat or flame. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove all sources of ignition. Absorb spills using a solid absorbant such as vermiculite. Blanket large spills with foam to reduce fire hazard.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use. Do not store for more than 60 days from date of shipment without checking the inhibitor content.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Protective gloves.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sweet ether-like odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: 88 mm Hg at @20 deg. C

VAPOR DENSITY (AIR=1): 3

BOILING POINT (C): 73

SOLUBILITY IN WATER: 2.3 wt.% @20 deg. C

SPECIFIC GRAVITY (H2O=1): 0.932 @20 deg. C

EVAPORATION RATE: (BuAC=1): 8.89

ODOR THRESHOLD: 0.12-0.4ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents, mineral acids, strong alkalies, peroxides and high temperatures. Reacts with water forming acetic acid and acetaldehyde.

HAZARDOUS POLYMERIZATION: May occur when exposed to heat, light, peroxides, high temperatures or oxidizing agents.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide and carbon dioxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place. Waste material may be burned in a controlled manner in an approved incinerator.

14. TRANSPORT INFORMATION

• CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Vinyl acetate, inhibited
HAZARD CLASS: 3 (flammable)
IDENTIFICATION NUMBER: UN1301
REPORTABLE QUANTITIES: 5000 lbs
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 3B

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 203-545-4

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 11

S: 6, 23, 29, 33

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Av - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Code, and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Date: July 19, 2004

Michael T. Nowak
Michael T. Nowak

Attachments:

- Exhibit 1: Lenz, R., *Organic Chemistry of Synthetic High Polymers* 749 (1967)
- Exhibit 2: *Lange's Handbook of Chemistry* 7-876 and 7-90 (13th ed. 1985)
- Exhibit 3: Material Safety Data Sheet for vinyl acetate
- Exhibit 4: Material Safety Data Sheet acrylonitrile